# Autonomic dysreflexia and boosting in disability sport: exploring the subjective meanings, management strategies, moral justifications, and perceptions of risk among male, spinal cord injured, wheelchair athletes.

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# Autonomic dysreflexia and boosting in disability sport: Exploring the subjective meanings, management strategies, moral justifications, and perceptions of risk among male, spinal cord injured, wheelchair athletes.

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**Abstract**

Autonomic dysreflexia (AD) is a potentially life-threatening condition unique to individuals with spinal cord injury above the sixth thoracic spinal level. When this condition is induced by spinal cord injured athletes to enhance performance it is known as *boosting*. Given that little is known about this practice from the perspectives of the athletes themselves, we draw upon interview data with a sample of male, spinal cord injured, wheelchair athletes to explore their experiences of AD and boosting in relation to how they perceive and negotiate the fine line between the latter two conditions; how they experience positive benefits and manage unpredictability; how they conceptualize risk; and their moral justifications for boosting. Our thematic analysis suggests that our participants understand boosting via a process of experiential learning that involves them operating as ethnophysiologists within a boostogenic environment that can foster moral disengagement and encourage athletes to take dangerous health risks. The implications for policy and practice are considered.

Keywords: Autonomic dysreflexia and boosting, spinal cord injured wheelchair athletes, experiential learning and managing symptoms, motivations for boosting, perceptions of risk and moral justifications

**Introduction**

According to Gee, Lacroix and West (2018), autonomic dysreflexia (AD) is a potentially life- threatening condition unique to individuals with spinal cord injury (SCI) at or above the sixth thoracic spinal level (T6). They note that AD is characterized by a sudden increase in blood pressure resulting from afferent stimuli below the level of the injury that excite sympathetic preganglionic neurons and trigger systemic vasoconstriction. The most common trigger for AD is bladder distension or urinary tract infection. Other triggers include pressures on the skin, prolonged sitting, testicular strangling, and temperature changes. Common signs and symptoms of AD include severe headaches, profuse sweating and flushing (above the level of injury), and blurred vision, (Mills & Krassioukov, 2011). These are usually resolved following the removal of the stimulus (e.g., emptying the bladder). However, as Gee, West and Krassioukov (2015), and Gee et al. (2018) emphasize, if an episode of AD goes undiagnosed or left untreated, this may lead to numerous severe complications including cerebral hemorrhage, myocardial ischemia, seizures, and death.

For most people living with a high-level SCI, AD is an unwelcome complication and intrusion into their daily life that has to be managed in order to avoid its painful consequences and health risks. In contrast, some athletes with an SCI above the sixth thoracic spinal level actively seek to induce AD by inflicting suffering on parts of the body below the lesion where pain perception is lacking for the purpose of improving sports performance. This practice is known as *boosting* and is unique to disability sport. Common techniques used to boost include winding leg straps too tightly; constricting the feet, legs or scrotum; or blocking the catheter to allow overfilling of the bladder. To

understand why athletes engage in such practices it is necessary to acknowledge the limitations they operate under in exercise settings.

Mazzeo, Santamaria and Lavarone (2015) note that an athlete with a high-level SCI has reduced physiological resources for improving cardiac output and obtaining maximal oxygen uptake, and thus for maintaining endurance when competing. During exercise, Gee at al. (2018) point out that AD can activate sympathetic circuitry below the level of injury that otherwise remain dormant due to interruption of descending sympathetic spinal. When this happens, due to boosting, according to Mazzeo et al. there is an increase in blood pressure and blood flow to working muscles coupled with an adrenaline spike that can lead to improved athletic performance. In a prospective, controlled, crossover study of six trained athletes with high-level SCI, conducted by Schmid, Schmidt-Trucksäû and Huonker et al. (2001) found that boosting led to a significant increase in the release of adrenaline and noradrenaline during exercise compared with the 'non-boosted' state. Additionally, these athletes displayed significantly higher peak power, higher blood pressure, and higher maximal oxygen uptake while experiencing AD. Summarizing its performance enhancement potential Gee at al. (2018) state that 'research on the effect of boosting on laboratory based indices of performance found 6.9% and 9.6% improvements in peak power and time-trial performance, respectively' (p. 2398). Boosting, therefore, can be used to compensate for specific physiological limitations during competition and also to gain an advantage over others.

As a method of performance enhancement that involves what Chatterjee and Bains (2018) and Mazzeo et al. (2015) describe as non-pharmacological doping or doping without drugs, boosting has been a concern within disability sport for a number of years (see, Harris, 1994; Legg & Mason, 1998; Long, Meredith & Bell, 1997; Webborn, 1999). Boosting was first prohibited by the International Paralympic Committee (IPC) in 1994 because of concerns surrounding the ethics and performance-enhancing properties of the practice. Since then, given their duty of care to ensure athletes are competing in a safe manner at sanctioned events, the IPC has become increasingly concerned with the potential health risks for those involved. Thus, in their *Position Statement on AD and Boosting*, while the IPC (2016) recognize that this reflex may happen spontaneously or may be deliberately induced by boosting, they state that this constitutes a health hazard and 'forbids' athletes to compete in a hazardous dysreflexic state (considered to be present when the systolic blood pressure is 180mm Hg or above).

The IPC also state that any deliberate attempt to induce AD (i.e., to boost) is 'forbidden'. As pointed out by Blauwet, Benjamin-Laing, and Stomphorst et al. (2013) the IPC Medical Committee initiated an Operational Management Plan to test for the presence of AD at major international competitions beginning in 2008. The objectives of this programme were as follows: (1) to provide education regarding the dangers of AD and protect the health of Paralympic athletes, (2) to deter the practice of boosting and (3) to ensure fair play in Paralympic sport.

Despite the good intentions of the IPC, Blauwet et al. (2013) point to the problems of testing for boosting at sporting events in real time. For example, they state that most of

the clinical signs and symptoms of AD are difficult or impossible to measure objectively. Additionally, Blauwet et al. argue that the detection of many of the specific methods that athletes use to induce AD would require unacceptably obtrusive inspections of the athletes at the competition venues (also see Gee et al., 2015). Acknowledging that concerns have been raised about boosting in wheelchair rugby Blauwet et al. note that the problems of testing are due to the very nature of this sport that involves elements that may lead to the unintentional induction of AD. For example, the frequent and sometimes violent collisions that occur during competition may elicit a dysreflexic response.

Blauwet et al. (2013) also point out that the practice of tightening straps across the athlete's legs in order to secure the athlete into his/her wheelchair may provide a noxious stimulus to an extent that induces AD. The dilemma here is that over-tightening leg straps in wheelchair rugby, and other wheelchair sports, can be seen as either an unintentional or an intentional means of inducing AD prior to competition. According to Blauwet et al. it would therefore be' very challenging, if not impossible, for officials to distinguish the intentional induction of AD (ie, boosting) from the unintentional induction of AD that is caused by the rigorous nature of the sport itself' (p. 5). Against this complex backdrop, Gee et al. (2015, 1138) note that 'no athlete has ever tested positive for boosting at an IPC-sanctioned event.'

Even though boosting serves the same purposes as doping and is a method of performance enhancement the World Anti-Doping Agency (WADA) make no direct statement on this practice. For example, it is not included in the WADA (2015) global rulebook outlining what is and is not considered an anti-doping rule violation. Also, boosting is not mentioned in their 2019 Prohibited List that specifies which substances and methods are banned and prohibited at all times in particular sports and under what conditions (e.g., in-/out-of-competition). This is surprising given that, for WADA, a substance or method would be considered for their Prohibited List if they met any two of the following three criteria:

- It has the potential to enhance or enhances sport performance
- It represents an actual or potential health risk to the athlete
- It violates the spirit of sport

Boosting as a method of performance enhancement and a form of doping without drugs, therefore, remains an ambiguous and contentious issue in disability sport. The current situation is that no accurate data is available on how many SCI athletes use this method. As Blauwet et al. (2013) point out, although anecdotal and clinical evidence suggests that the boosting occurs, its true prevalence remains uncertain.

To date, AD and boosting has been studied mainly from a biomedical standpoint in laboratory settings. Gee et al. (2018) and Mazzeo et al. (2015) acknowledge that whilst such studies provide critical insights into the mechanisms of these conditions they do not tell us much about the important psychosocial dynamics involved. Few attempts have been made to understand boosting from the perspectives of the SCI athletes themselves. A rare exception is the work of Bhambhani, Mactavish and Warren et al. (2010) who used a questionnaire in the first study to explore the knowledge, incidence, and attitudes towards boosting of 99 Paralympic athletes who had an SCI at or above the

sixth thoracic spinal level. With regard to their knowledge of the health effects of boosting, Bhambhani et al. state that 49% of the male and female respondents agreed that boosting was somewhat dangerous to health with 21.1 and 24.6% feeling that boosting was dangerous or very dangerous to health, respectively.

Significantly, Bhambhani et al. (2010) found that when their participants were asked whether they had intentionally induced AD (i.e. boosted) during competition and /or training, of the 60 who answered this question, 10 (16.7%) responded positively, 9 of whom were men. Of these, the incidence was highest in wheelchair rugby players followed by those participating in wheelchair athletics, namely, marathon racing and long distance racing. As a sport, wheelchair rugby requires high level intermittent bouts of exercise over 4 quarters each lasting 8 minutes in duration. Players have been recorded as completing between 36-52 high-intensity efforts each lasting 1.7 – 1.9 seconds per match (Rhodes at al., 2015a), with peak speed being identified as central to successful athletic performance (Rhodes at al., 2015b). Given such demands, and given the positive effects of boosting as described above by Schmid, Schmidt-Trucksäû and Huonker et al. (2001) and Gee et al. (2018), it is reasonable to assume that boosting will have a positive effect on the physiological performance of players in wheelchair rugby and give them an advantage over others during competition and/or training.

Understanding why some SCI athletes choose to boost despite knowing the risks to their health remains difficult to ascertain via surveys alone. As Bhambhani et al. (2010) state:

> The use of a self-report questionnaire to obtain information on a sensitive issue such as doping runs the risk of under-reporting by the athletes, and therefore, could be misleading. As well, the reproducibility of the responses to these sensitive issues may be questionable. From a research perspective, it is crucial that the perspectives of the athletes' be accurately documented, so that appropriate intervention strategies can be implemented by the sport governing bodies. (p. 2183)

The call to accurately document the perspectives of athletes regarding AD and boosting, it supported by Hanson (2009) who notes that for the purposes of designing new educational programmes, it would be useful to gain an understanding of the prevailing beliefs of athletes about the use of performance enhancing drugs, other methods, and their consequences. He concludes that, given the current lack of information about athletes' existing beliefs, 'it seems that a qualitative research project, based on in-depth interviews, would be an appropriate start' (p. 405). In this article, therefore, we provide the first interview-based study of a group of athletes with high level SCI that explores their subjective experiences and understandings of AD and boosting.

## Methodology

Building on the trusting relations developed via prolonged immersion in the field during a 4-year ethnographic study that explored the experiences of people with SCI involved in disability sports (Authors, dates), and following university ethical approval,

Author X used snowball sampling to access five male wheelchair rugby players in the UK with a SCI above the sixth thoracic spinal level who were knowledgeable about boosting. Three of these had played at the national level (Alex, Drew and Seb), one at regional (Jesse) and one at club level (Aaron). In addition, Author X was able to access six male wheelchair rugby players from North America all of whom has played at the national level (Adam, Andy, Ben, Jacob, Stefan, and Kirk).

One participant, Brad Zdanivsky, was selected by opportunistic sampling as he had published a journal article in 2010 that discussed his own use of boosting as a climber. Given that the rest of our participants are wheelchair rugby players, the inclusion of a wheelchair climber might seem a strange choice. For us, however Brad constitutes a critical and intrinsically interesting case as he is one of the few athletes who has publicly admitted to boosting, given his rationale for doing so, and documented his experiences whilst in a boosted state via his blogs and his extensive provision of real time physiological data (see http://vertical challenge.org/projects/performance-boosting). Furthermore, Brad has worked collaboratively in a the laboratory setting with physicians plus clinical and high performance physiologists to help them better understand this phenomenon and why athletes might choose to boost even though they understand its dangers. As Warburton (2010) notes in his discussion of this collaboration there is much that we can learn from the case of Brad as a self-defined 'outlier,' that challenges our thinking about AD and boosting in disability sport.

Given this publication Brad agreed that his real name be used in our article. We refer to his published article as Zdanivsky (2010) and when we refer to his comments in interview we attribute it to Brad. Other than Brad, all names used in this article are pseudonyms. Identifying biographical details have been omitted and only general information necessary to provide a context for our analysis has been included. The age range of the participants was from 25 to 53 with an average age of 36 years old. Participants have been involved in wheelchair rugby for at least 5 years and a maximum of 20 years.

Initial contact was made with each participant via email to explain the purpose of the study and the ethical processes involved (e.g., anonymity and the right to withdraw at any point without explanation). Informed consent was confirmed verbally at the start of each interview. Author X conducted face-to-face interviews with participants based in the UK and Skype was used for those located in North America. The interviews were semi-structured in nature to focus on how they acquired their SCI and became involved in disability sport, and finally their experiences and thoughts about of AD and the practice of boosting. Interviews lasted between 1 to 1.5 hours, were audio recorded, and transcribed verbatim.

The interview data were subjected to a thematic analysis as described by Riessman (2008). Here, primary attention is given to content, of *what* is said rather than 'how,' 'to whom,' or 'for what purposes.' Such an approach, according to Braun, Clarke and Weate (2016) is useful for identifying patterns of meaning (themes) across a qualitative dataset and interpreting their importance. For us, this involved Author X and Author Y separately conducting multiple readings of the transcripts to become intimately

familiar with their content. Each made notes on what they felt were the key themes in the reflections provided by the participants in their interviews. Authors X and Y then came together to discuss their notes, share ideas, and agree on the key themes that would best help them make sense of their interview data. These were as follows: managing AD as a natural phenomenon and the fine line between boosting; experiencing positive benefits and the unpredictability of AD/boosting in sport; perceptions of risk; and moral justifications for boosting.

Given the constructionist position held by Author X and Y, that adheres to a relativist ontology and a subjectivist epistemology as described by Sparkes and Smith (2014), their discussions about possible themes should not be construed as an attempt to engage in a crude form of inter-rater reliability. The latter, according to Smith and Sparkes (2016), refers to the procedure of bringing together two or more researchers to independently code interview data, to compare these codes, and then together seek a high level of agreement/consensus though discussion. They point to numerous problems with this concept that make it untenable that include the following. For example, there is the possibility that coders agree by chance. Other problems noted by Smith and Sparkes include the absence of an agreed-upon threshold for what constitutes a high-level of agreement among coders (e.g., 70%, 80% 90%, 95%, 99%), personal interests, and the power relationships between coders that can shape what is said, what is not said, and how the discussions unfold. A further problem pointed out by them is that often the researchers who do the coding are often theoretically homogenous (i.e., they share the same theoretical background and interests), and therefore will read the data similarly. Not surprisingly, they conclude that inter-rater reliability 'does not work in terms of ensuring reliable results or that the single truth has been found in an objective way' (p. 118).

In contrast to the notion of inter-rater reliability and its attendant problems, our discussions about possible themes are best seen as part of a process of co-constructing and negotiating plausible, coherent and theoretically informed interpretations of the reflections provided by our participants regarding AD and boosting. Throughout this process, like Sparkes and Stewart (2019) we acted as conceptual bricoleurs who drew on various disciplines in co-constructing and negotiating our interpretations using a mixture of inductive and deductive reasoning. This mixing is known as abductive reasoning and involves, according to Ryba, Haapanen, Mosek and Ng (2012) 'a dialectical movement between everyday meanings and theoretical explanations, acknowledging the creative process of interpretation when applying a theoretical to participants' experiences' (p. 27). For example, on reading the interview transcripts of our participants we both noticed that they offered various kinds of justifications for boosting (i.e., inductive reasoning). To develop a more theoretically informed interpretation of the justifications offered we turned to the work of Boardley and Kavussanu (2011) who have drawn on the work of Bandura (1991) to explore how specific psychosocial mechanisms can lead to moral disengagement in sport. We then returned to the interiew transcripts and identified which of the psychosocial mechansims described by Boardley and Kavussanu (e.g., advantageous comparison) were being used in the justifications given by our partipants for boosting (i.e., deductive reasoning). This fluid movement between inductive and ddeductive reasoning characterized our engagment with all the key themes discussed below.

For ethical reasons and for the purposes of enhancing the credibility of our study we have constructed a text that provides the abundant concrete detail required of thick or rich description as described by Tracy (2010). For similar reasons we also engaged in the process of seeking member reflections that, according to Tracy allows for 'sharing and dialoguing with participants about the study's findings, and providing opportunities for questions, critique, feedback, affirmation, and even collaboration' (p. 844). Thus, we sent a previous copy of this article to all our participants and invited them to reflect on whether our interpretation and representation of their views and experiences were accurate, fair, and recognizable to them. Any reflections offered were not taken as a direct validation or refutation of our findings but rather as another source of data and an opportunity for further collaboration and reflexive elaboration (Sparkes & Smith, 2014). The feedback received from our participants indicated that they were happy for this article to be published in its current form. With these points in mind, we now present the findings of our thematic analysis.

**Managing AD as a natural phenomenon and the fine line between boosting**

During rehabilitation in specialist units, all our participants were informed about AD, the symptoms, and what to do when it occurred. Significantly, the practice of boosting in sport was never mentioned. Despite being armed with such information our participants emphasized that they only came to really understand the dynamics of AD and how best to manage it in their daily lives and in sport through actually experiencing it. As Jacob commented:

> I first became aware of it before I started playing. I had a couple of bouts of it right away when I was just learning about my disability. Had the bad headaches that came with AD, like the back of your head is screaming at you… It was from not quite understanding my bladder. I was relatively new, probably less than a year out from my injury and figuring out the signs in terms of my body.

Stefan confirms this early experiential learning regarding AD and boosting that happened to him 'by accident':

> I was literally a year post-injury. I knew the importance of hydrating, and so during rugby matches I would probably drink more water than what I would do in a normal timeframe in between cathing. I just noticed that there were certain times in the game when my bladder would fill and maybe initially it would give me a really nice little energy boost … Just accidentally learning about boosting. But I learned quickly … It's kind of a weird deal but you understand your body.

Experiencing AD and managing it in different contexts led our participants to see it as a 'natural' occurrence that can happen for various unintended reasons. As Ben stated:

> I've never purposefully created it. There are other things that can happen to me that will cause it, but I don't purposefully do it. I mean if I scratch my legs before I can feel it coming on, if there's something going on with my body, like I'm

> lacing my shoe a little bit wrong, something like that, I can feel that coming on but I don't on purpose, to me it's very uncomfortable when it comes on.

Likewise, Andy emphasised that AD can happen by accident in a game:

> Some guys, when it happens to them they're not doing it on purpose, they may have a kink in their catheter tube or they just may not have had time to go to the bathroom because a lot of times on weekend when we're doing rugby it's a back to back game where we don't have time in between to go to the bathroom.

These issues of naturalness and happening-by-accident led to ambiguity regarding the difference between AD and boosting. For example, based on its physiological effect, Kirk equates AD with boosting even when he is not playing sport:

> I noticed it (AD) very early on, when I have to pee and I need to get to the bathroom … So, every time my bladder fills up, which is six, seven times a day, my blood pressure goes up and I'm essentially boosting every day. It's not in a danger zone, but nevertheless that is boosting … The extent to which athletes intentionally do that is kind of, it's really a grey thing, because it's almost impossible to avoid to a certain extent.

Similar ambiguities are evident when Andy reflects on the effects of AD when it occurs in a wheelchair rugby game:

> We don't intentionally do it… With spinal cord injuries we have trouble controlling our bladders and our urinary continence, so a lot of guys who can't void their bladders on their own, when they're playing, unless they're using a catheter the bladder is just working that much harder and that's what creates the blood pressure boost.

Despite his claim above, when asked if he had ever boosted during a game, Andy responded as follows:

> It's definitely something I've done … There have probably been times where I've started playing a rugby game where I didn't go to the bathroom beforehand and I knew I was going to have to piss,…. But going into certain games where it's a championship game or something like that, there's definitely been a couple of games where I know I've had to need an energy boost and probably not gone to the bathroom beforehand … it definitely helps you get a little bit more energy, and I've definitely felt the effects of it.

Accordingly, several of our participants spoke of the 'fine line' between enjoying the benefits of AD when it occurs 'naturally' during a game and actually inducing it intentionally by boosting. As Jacob stated:

> I don't intentionally set out to fill my bladder so I can play better. The hard problem with spinal cord injury and boosting is, there's that fine line between are you hydrated enough to play your sport where you need to pee? Or, are you just hydrating to try and get a boost in your performance? So I think for me it's that fine line with trying to be hydrated for performance but not boosting intentionally.

This fine-line made is difficult for several of our interviewees to decide if boosting was cheating. For Jesse, taking drugs to enhance performance in sport was cheating. But when asked if boosting was cheating he replied, 'That's a tough one. No, I wouldn't put it in that category. But, I don't know.' Some of our interviewees resolved this dilemma by reference to specific acts involving an external object, such as, the use of a clamp on the catheter to prevent urination and fill up the bladder. As Aaron explained:

> Shutting off your catheter to cause dysreflexia, that way is cheating because it's using a foreign aid …. I think that that (bending toes back to induce AD), that's a fine line. I see that as using what you've got to improve performance. I've got no problem with that because I see it that you are using what you've got.

The study by Bhambhani et al. (2010) found that most of their respondents gained their knowledge about the symptoms of boosting through their personal experiences (61.7%). While the comments above from our participants are consistent with this finding, they offer a more nuanced understanding of how, via a process of experiential embodied learning SCI athletes come to know AD in and though their bodies as a prelude and/or preparation to engage in boosting. Importantly, given the natural occurrence of AD due to their high level SCI, the comments reveal that for our participants there is permeable and ambiguous boundary, or 'fine line,' between AD and boosting which can reduce their sense of agency and deflect attention away from any personal responsibility they might have for the occurrence of the latter. Alongside this, is the need to recognize the positive feelings and benefits associated with AD and boosting that might encourage its use by SCI athletes.

**Experiencing positive benefits and the dilemma of unpredictability**

In their survey of Paralympic athletes Bhambhani et al. (2010) found that the four most frequently reported benefits of boosting during competition were increased circulation, less fatigue and increased arm endurance along with increased aggression and increased alertness. Whether accidental or by boosting all of our participants acknowledged feeling the positive effects of AD on their performance levels and that this influenced how they perceived themselves as disabled athletes. When asked about how he felt when experiencing AD, Adam responded:

> It's like suddenly it's easier to push and I can breathe better and my blood pressure rises a little bit …I call it feeling normal. Us quads typically have such low blood pressure … but when it went up to 120 over 80, which would be considered normal, wow, I feel awake, more alert, and I can push a lot faster and I don't get as much fatigue … You feel normal, you don't feel as 'quady', if that's a word. I guess it is a kind of a high because, you know, your normal quad state is such a low blood pressure and you just feel kind of lethargic all the time, whereas if you do get those little boosts you do feel a little more awake. So yeah I can see where it could be described as a high, especially if you're in the middle of a competition

Kirk also spoke of experiencing a 'high' during his episodes of AD:

> Not a euphoric high, not like an opiate type of a high, but you feel like your arms do not get tired, you can just go and go and go. My cadence goes up and my force application goes up, everything goes up. I would imagine it's just like someone taking stimulants basically, that's what it feels like. It really does make a huge difference, an enormous difference - power output, average speed … Obviously you can reach fatigue and get tired, but boy it takes a lot longer, that threshold, that bar goes way up. … It just makes you pissed off, like, 'God, why couldn't I have had a cord injury just a few inches lower?'
>
> Set against the performance benefits of AD/Boosting is it important to note the

point made by Gee et al. (2018) that that the cardiovascular response to AD and boosting is highly variable, unpredictable and difficult to control. All our participants noted the unpredictability of each and how difficult it was to control them so that the benefits could be gained at a predetermined moment in time. Jesse spoke of AD and its performance effect as happening 'by luck' while Jacob saw it as a process of 'trial and error' in which you experiment on yourself to see what works. Likewise, Kirk stated, 'It's frustrating because its such a finicky variable. It's just marginally within your control. So, its really frustrating if you really care about your performance.' Brad echoed this view, 'There's a sweet spot to be found, and that is such a difficult thing to hit, and I don't think you can do it like, there's three minutes left in a game, everybody boost. … It's not something you can easily dose. It's not like turning a dial.' This lack of control and predictability along with its consequences are summarised by Seb who states, 'it's so unpredictable … It'd be great if it worked that way because then there'd be like a set formula and guys could figure out how to do it safely but it's not consistent at all'.

The points made by our interviewees are reinforced by the reflections of Zdanivsky (2010) regarding his experiences of boosting.

> The art is in balancing the timing of the heart rate depression to only last a few moments while blood pressure rises. After this I will feel a surge of power as I "drop the hammer". If the AD is mild, my heart rate will recover and stabilize above the normal maximums. This is the ideal outcome, but not easy to achieve on demand … There is no way to know how much stimulus (pain) to apply to get a desired increase in blood pressure. (pp. 40-41).

The comments above indicate how our participants felt the positive impact of AD and boosting on performance both in and through their bodies in sports settings. While these performance effects were welcomed they remained problematic due to the unpredictable nature of AD and boosting which reduced the ability of the athlete to control and predict their occurrence during a game. Thus, our participants faced the dilemma of placing themselves at risk with no guaranteed return in performance terms. Accordingly, we now turn our attention to how our participants conceptualized the issue of risk.

**Perceptions of risk**

Like the majority of Paralympic athletes in Bhambhani et al's. (2010) survey, all our participants were aware of the potential dangers of AD and boosting. In discussing his choice to boost as a way of enhancing his climbing performance, Zdanivsky (2010) offers the following observation:

> There are also serious potentially life threatening consequences of inducing AD. The problem is that AD can cause a marked increase in blood pressure, with a dramatic drop in heart rate. In my case, my blood pressure can rise (within seconds) from 100/60 to 220/160 mmHg, while my heart rate (normally 55-60 bpm at rest) can go into the low 30s for several minutes. These are very large swings to the extremes in a short time, and can be very unpleasant and potentially very dangerous … I am fully aware that trying to induce and modulate AD is akin

to playing with fire. (pp. 40-41)

In interview, Brad stated, 'It's like throwing jugs of gasoline into a fire and seeing what happens. Is it too little or a little too much? Oh crap! That was way too much, now I'm actually risking a stroke.' For some, these dangers and the associated unpleasant feelings were enough to prevent them from boosting. As Ben stated, 'so those two factors, knowing how dangerous it was and feeling how painful it was for me, those always discouraged me from doing it on purpose.' Others also had negative experiences of AD and boosting but this did not deter them from experimenting with their bodies. Kirk notes a number of 'close calls':

> I've gotten into situations where my blood pressure felt way too high, and basically you just get a really, really severe headache and it's so painful that you have to pee. I can imagine if you went beyond that point that's when really bad things would happen, but I've always been able to cath when I needed to.

Kirk also recalls an occasion, just before the start of a competition when things did not go to plan:

> I got into a situation once, the scariest thing that ever happened in my career was I took some Sudafed, just a normal dose, and boosted at the same time. It precipitated this unbelievable reaction. To this day I'm not sure what happened … I had to go to the hospital … What was scary was after I emptied my bladder, the blood pressure didn't go down, and then it took a long time to come down. For the next few weeks any time my bladder marginally filled I would have this full on, just the worst dysreflexic reaction I've ever had in my life, and this lasted for three weeks … I thought I was going to die. I really thought I was going to have a stroke because it was more intense than anything I've ever experienced, it lasted longer. I felt like I was out of control, I had no control of it.

Reflecting on the dangers of AD and boosting, our participants often invoked the notions of control linked to a learned awareness of bodily feelings and their meanings for the individual involved. Jacob offered the following observation:

> It's kind of a weird deal but you understand your body … Most of us use an external catheter, so pee goes in the leg bag. If I'm peeing during the game that's pretty normal. But if that headache starts to come around and I'm like, 'Whoa.' Then I'll just actually empty my bladder mid game. It's just not worth it to me. So for me it's understanding my body, understanding my signs that my body's given me over thirteen years of spinal cord injury. So when those signs come I'm not messing around …I'm not going to die over a wheelchair rugby game.

Likewise, Stefan talks of knowing the signals his body sends out and how these can be used to control the intensity of boosting and offset it dangers: 'I've done it. There are different tricks that guys use to get their blood pressure up. I know it's dangerous, or can be dangerous if you don't know what you're doing. But I kind of learned about it accidentally early on.' For Jacob this involved him trying to be 'good at experimenting with myself.' Echoing these views Brad bluntly states, 'Doctors can't tell you, they can give you advice, they can say things might be dangerous for you, but they can't stop you from doing what you want to do. I don't need their consent to experiment on my own body.'

With regard issues of experimentation in relation to boosting, Drew noted, 'Nobody is educated about boosting risks. It's not written about in books. And, former athletes, they don't talk about it, they don't teach about it.' Accordingly Kirk pointed out that 'a lot of people are doing this kind of in the dark. They really don't know the risk. They know the feeling but they don't know what that feeling really means and what to do.' Like several of our participants Stefan thought that it would not be long before somebody died from boosting. This said, he once again appeals to the notion of rational cognitive control to prevent this outcome:

> I would like to think that in terms of risk/reward, that guys will use their heads and be smart … I would like to think that all it takes is that one scary experience for guys to know it's not worth it… And I'd like to think that people in general are smart enough to know, 'Hey I don't want that to happen again, but I know I can get to this limit and it does help me on the court, but once I get to that limit I know within the next five minutes I've got to go pee, otherwise something more dangerous could happen.

The metaphor of 'playing with fire' would seem apt in terms of how our participants conceptualized the risks of boosting to their health. They clearly knew the risks involved but offset any concerns by holding to the view that over time they could learn to understand their bodily reactions to boosting and thereby gain some form of rational control over its occurrence and consequences. This is problematic in terms of the point made earlier about AD and boosting being unpredictable phenomena.

In terms of boosting as a form of risk taking practice, it is interesting to note that in Bhambhani et al's. (2010) survey nine out of the 10 respondents who admitted boosting during completion and/or training were men. Their statistical analysis of the survey data also revealed that men were more likely to use boosting than females and that this difference was statistically significant. This suggests that boosting is gendered in nature. A number of scholars have explored the nexus of sport, risk, and gender. For example, in the 1990s, Messner (1992) and White and Young (1999), suggested that a hegemonic form of masculinity intersected with particular ways of engaging in sport, ways that embrace risk, downplayed health concerns, and often resulted in serious physical injury to self an others. More recently, Wellard (2009) spoke of expected masculine performances in mainstream sport, that whilst part of a wider hegemonic formation, place a particular emphasis on bodily performance and bodily displays that signal to opponents and/or spectators a particular version of masculinity based upon aggressiveness, competitiveness, power, assertiveness and risk taking. Developing such work, and building on Connell's (2002) notion of 'gender regimes,' as well as Donnelly's (2004) consideration of the 'culture of risk', Laurendeau (2008) explores gendered risk regimes and how they influence what Lyng (1990) describes as 'edgework' in various sports.

For Laurendeau (2008), the notion of edgework is, first and foremost, a way of conceptualizing certain kinds of voluntary risk activities. Importantly, for our consideration of boosting, it is not just about the danger associated with the activity, but that practitioners have a particular interest in courting danger while still maintaining control over themselves, their equipment, and their surroundings. The 'edge', then,

according to Laurendeau is that point at which risk takers are in peril of losing control. He also speaks of 'crowding the edge' that involves taking progressively greater risks in the activity, and also 'falling off the edge' that involves taking the activity beyond one's ability to handle it (e.g., technically, physiologically, emotionally), and, as a result, failing to maintain control. Thus, given the unpredictable nature of boosting and their desire to gain control over it the as described above by our participants, we might begin to think of those who choose to engage in this risky practice as always being on the edge with some being more willing at times to crowd the edge in pursuit of a competitive advantage. Significantly, as pointed out, by Kirk when he recalled the worst dysreflexic reaction he'd ever had in his life, and when he thought he was going to die, the possibility of falling over the edge is ever present when, as Zdanivsky (2010) puts it, you play with fire when you boost.

The willingness of some disabled men to crowd the edge with regard to the health risks involved in boosting is encouraged by the cultural norms of wheelchair rugby that support the performance of the expected sporting masculinity described above by Wellard (2009). In relation to this, Authors (date) point out, that wheelchair rugby, which is often known as 'murderball,' is recognized as one that celebrates aggressive and/or violent behaviours towards self and others whilst also accentuating and valorizing risk-taking. Thus, in their critique of the documentary film *Murderball* released in 2005, that tells the story of the apparently intense rivalry between the Canadian and United States men's national wheelchair rugby teams, Gard and Fitzgerald (2008) note that the action contained in it constantly reiterates the hypermasculinity and physical toughness of the players and the way that they relish the sport's alleged brutality.

Lindemann and Cherney (2008) also reflect on watching wheelchair rugby players speed around a basketball court in their chariot-like wheelchairs, smashing into and tipping each other over, and how the players 'proudly display their willingness to sacrifice their bodies, claiming that they play rough and are always ready to take a spill for a loose ball' (p. 108). They make the important point that such displays are communicative acts that can serve several functions. For example, they can challenge ableist views of disability and transform the stigma associated with their condition via enactments of hypermasculinity. At the same time, Lindemann and Cherney recognize that these displays reify patriarchal notions of gender and sport as well as validates traditional, often ableist norms of masculinity that complicate the social meanings of disability sport. Likewise, we would argue that these displays also complicate the social meanings of boosting as a communicative act involving health risks embedded within the cultural matrix of wheelchair rugby. This is particularly so if, as Lindemann and Cherney suggest, some disabled male wheelchair rugby players take measures to distance themselves from others with more severe impairments by performing extreme forms of what they call 'daredevil masculinity' that may lead them to eschew the risks involved and engage in boosting. All of which raises questions about how our participants justified the practice of boosting to themselves and others.

**Moral justifications for boosting**

In Bhambhani et al's. (2010) study of Paralympic athletes, the majority of the

respondents held the view that it was not acceptable to use boosting to improve sports performance. None of our participants held this view. In making their case to justify boosting they displayed various forms of of moral disengagement in action. According to Bandura's (1991) theory of moral thought and action, eight psychosocial mechanisms are available that allow people to act in ways normally considered immoral without experiencing the negative affect usually associated with such conduct. The use of these mechanisms is termed moral disengagement. Drawing on this work and applying it to sport, Boardley and Kavussanu (2011) note that the following mechanisms operate on the detrimental conduct itself: moral justification, euphemistic labelling, and advantageous comparison. With regard to mechanisms concerning one's accountability for action they speak of displacement and diffusion of responsibility.

All of our participants claimed to understand the motivations for athletes to boost in terms of the pressures to win and the financial rewards available in elite disability sport. For Stefan there was no differerence here between able-bodied and disabled athletes: 'So what? They're disabled, but they're also competitors and they want to win, so if they can get an advantage they're going to do it.' Drew adds: 'And like in able bodied sport. Money is forcing players to do illegal things to get results like doping and boosting, and it will not stop.' Ben's comment also supports this normalizing view of performance enhancment by boosting:

> I can tell you that if a Paralympic gold medal was on the line and I knew that I could drink a bunch of water right before it and go from eighth place to first place by using it, I would definitely be tempted to do it … I can see the motivation for it, and there are a lot of pressures that are out there, like, funding through the programme, and everybody's trying to find an edge.

The comments by Stefan, Ben and Drew regarding the perceived social pressures to win due to concerns over external funding as a rationale for boosting provide an example of the displacement of responsibility in action. According to Boardley and Kavussanu (2011) this occurs when people 'view their behaviour as resulting from social pressure or instruction from an authority figure and not something for which they are personally accountable' (p. 95). Linked to this, when Ben states 'everybody's also trying to find an edge,' his use of 'everybody' suggests he is diffusing responsibility of individual action to a larger group of others. Finally, his notion of 'finding an edge' may be seen as an example of euphemistic labelling which acts to make a questionable behaviour (i.e., boosting) appear more acceptable though the selective use of language.

The notion of 'finding an edge' was however problematised by several of our participants in relation to changes that have taken place within the functional classification system of the International Wheelchair Rugby Federation (IWRF, 2011). Up until 1991 the classification system was medically based and there were three classes, largely determined by medical diagnosis and level of SCI. In 1991, the system was changed to a functional classification system unique to the sport of wheelchair rugby (see IWRF, 2011). As discussed by Altman et al. (2014), this was done for many reasons that included the need to accommodate athletes with other health conditions such as multiple amputations, cerebral palsy, and neuromuscular disease that wanted to participate in this

sport. Such a change was not without its problems as evidenced by the survey conducted by Altman et al. of 302 athletes and stakeholders in wheelchair rugby regarding their concerns about the current classification system and how to improve it. As part of this survey, in order to examine eligible impairments for wheelchair rugby, the participants were asked if wheelchair rugby should *only* be open to athletes with SCI and other neurological conditions. A minority (36% of respondents) responded 'Yes.' Against this backdrop, Adam offers the following observation:

> It's something that the classification committee at the IWRF and IPC level is going to have to address - looking at autonomic impairment. It makes such a difference between having a spinal cord injury and then having an amputation or something or having an intact nervous system. It's comparing apples and oranges. It's just completely different and the classification really hasn't kept up with the inclusion of the less disabled athletes. It's happening in track too … there's nobody with a spinal cord injury winning medals now, it's all people with amputations, orthopaedic impairments and so on, people with intact nervous systems. It's just unfair and perhaps that could entice people to want to enhance their performance.

Stefan raises similar concerns especially in having to compete against amputees in wheelchair rugby:

> I'm kind of a purist. I saw it from the very beginning, and I remember when guys like (player names), these were guys who were walking in carrying their rugby chairs on their back, and then putting them down and jumping in their chairs. At that time we were like, 'Man, that's not right.' But seeing the evolution and where now we're seeing triple amps or quad amps, guys who play basketball, at a high level, transitioning over into what was once called 'quad rugby.' I feel like that we're kind of losing the point of the sport.

Echoing the concerns raised by Adam and Stefan, Jacob believes that high-level SCI players might need to boost in order to remain competitively 'relevant':

> I think guys are trying to do anything they can to gain an advantage, especially with our sport and there's so many dominant non-spinal cord injuries in our sport now … Too many high level functional guys are playing our sport and now the spinal cord injuries have to find new ways to be relevant on the court, otherwise they're going to get taken off the court or taken out the national team…. So I think that's part of it,… and they (amputees) have such an advantage with the respiratory systems and with being able to sweat, that spinal cord injuries are trying any way to stay relevant in the sport that was specifically made for them back when it originated. So I think there's a correlation there.

The comments above by Adam, Stefan and Jacob could be interpreted as them externalizing or attributing blame on a situation imposed on them by others, and which they have no control over due to the introduction of what they see as an unfair classification system by the IWRF and the IPC. In so doing, they displace responsibility

for boosting onto decisions made by powerful others. In addition, Adam's suggestion that boosting would enhance the success of SCI athletes and thereby reduce the discouragement felt by their peers, along with Jacob's notion of this would help SCI athletes maintain their relevance, can be seen as providing a moral justification for this practice. This kind of justification, according to Boardley and Kavussanu (2011), 'entails the cognitive reconstrual of a harmful behaviour into a praiseworthy one, making it personally and sociably acceptable by depicting it as facilitating a valued social or moral purpose' (p. 95).

Given the functional disparities described earlier, Kirk expresses a common view among our participants that boosting is not about getting an edge on other competitors (i.e., a form of cheating) but is actually an attempt to 'normalize'.

> We're not attempting to boost or go above and beyond, we're not taking drugs. We're trying to almost approach normal, and even if you boost properly you're nowhere near someone with a normal autonomic system. So, it's almost an attempt to normalise …. It's more about parity and equity than above and beyond. But again, you're still nowhere near parity, even with a successful boost. You're just kind of minimising the damage, you're minimising the inadequacies. It's really tough. It's a real frustration. With rugby it's even more pronounced because you have even more non-spinal cord injury participants.

The pressures described above to remain relevant and normalise the situation are also emphasised by Andy in his following statement:

> Sometimes feel that I need to boost, because the sport is evolving allowing triple and quadruple amputees into the sport. Now the function levels are just becoming that much more distant that a lot of guys just aren't able to keep up. True spinal cord injuries aren't able to keep up with some of these guys.

By suggesting that boosting is less morally questionable than taking drugs, Kirk makes an advantageous comparison. For Boardley and Kavussanu (2011) this involves 'comparing detrimental acts with more harmful ones, making them appear benign in comparison,' (p. 95). His use of terms such as ' 'trying to almost approach normal' and 'minimising the damage' to justify boosting can also be interpreted as euphemistic labelling in action. Finally, Andy's suggestion that boosting is justified in an attempt by SCI disabled athletes to 'keep up' with amputees in their sport, can be taken as a moral justification for this practice as described earlier.

**Discussion**

The participants in our study came to understand the meaning of AD and boosting along with how to 'manage' it via a process of embodied experiential learning. Such learning highlights the centrality of the sensory material body that *feels* the bio-physiological effects of AD and boosting as they occur, quite literally, in-the-flesh. Consequently, it is in and through their bodies, acting as what Evans, Davies and Rich (2009) describe as corporeal devices, that the various discourses (e.g., medical and

sporting) about AD and boosting are then mediated and given meaning in specific cultural settings (e.g., in rehabilitation centers and in wheelchair rugby clubs).

Via this process of embodied experiential learning our participants give personal meaning to any risks and dangers associated with AD or boosting. As their comments indicate, given the unpredictability of both along with the differential experiences of its symptoms, this kind of learning is based on trial and error as athletes experiment with their bodies to see how it feels and assess its effects on their performance. In this, our participants share similarities with those in Monaghan's (2001) ethnographic study of bodybuilding, drugs and risk. He describes these as *ethnopharmacologists* that adopt highly individualized, innovative, and experimental approaches to drug-taking, and who continually modify and devise seemingly idiosyncratic steroid regimes to suit their own particulars. The same can be said of our participants.

Clearly, given they are not taking drugs to enhance their performance our participants are not acting as ethnopharmacologists. Rather, since they actively manipulate and experiment with their own physiological mechanisms to induce AD and boost their performances they are operating as what might be described as *ethnophysiologists*. Practicing this role, several of our participants clearly developed a sophisticated understanding of AD and became highly attuned to its symptoms and experiential dynamics. Over time, as 'edgeworkers' (Lyng, 1990) these participants felt confident that they were able to read the signals from their body correctly and then, via a process of rational decision making act accordingly to manage the unpredictable risks and dangers of associated with boosting. Of course, as our participants noted, the notion of controlling AD and boosting is problematic and there is always the danger of 'falling off the edge' (Laurendeau, 2008), and suffering the consequences that go with this fall.

That our participants relied on a process of embodied experiential learning is not surprising because as Bhambhani et al. (2010) point out, although much has been written about the clinical effects of AD which occurs spontaneously there is minimal published scientific information available to athletes regarding its voluntary induction (i.e. boosting). As noted earlier, boosting was never mentioned to any of our participants during their rehabilitation in specialist units even though sports-related activities were used as part of their rehabilitation. They further note that the available boosting studies have focused strictly on the physiological responses of the athletes during exercise. Given this situation, Bhambhani et al. and Mazzeo et al. (2015), call for educational materials and programmes, using non-technical language, to be developed so that SCI athletes, along with medical staff, coaches, and rehabilitation professionals responsible for their overall health and safety can increase their awareness and knowledge about the potentially dangerous effects of boosting.

Increasing the knowledge of SCI athletes about boosting is certainly necessary. It needs to be noted, however, that anti-doping prevention programs informed by rational cognitive approaches based on knowledge transmission have by been shown to be limited in their effectiveness in changing behaviours (Backhouse, McKenna & Patterson, 2009). Accordingly, Elbe and Brand (2016) state that effective prevention programs 'need to go beyond a rational cognitive approach and should include mixtures of conveying

knowledge, skills, and adequate affection (values, self-awareness, and self-worth)' (p. 34). Our findings support this view since, as we have shown the experiential and affective dynamics of AD and boosting as lived in and through the bodies of the athletes themselves act as corporeal devices that mediate any information provided by external experts. We would ague, therefore, that any programme seeking to educate SCI athletes should be informed by the constructivist principles described by Hanson (2009) which would take as its starting point the athletes' actual embodied experiences of AD and boosting as a way of helping them to reflect on how their experiences are shaped by their practices as ethnophysiologists in specific cultural settings.

With regard to the moral justifications our participants gave for boosting, their comments draw attention to how their individual choices are shaped by structural conditions. Our findings suggest that some athletes choose to boost, regardless of the risks and dangers, due to what they perceive as a lack of fairness in the current classification system of the IWRF in particular, and the IPC in general, that allows individuals with autonomic complete SCI to compete against individuals with an intact autonomic nervous system (ANS) because they have similar motor function.

Creating a classification system that is fair and meritocratic for *all* impaired sporting bodies is, however, problematic. As Jones and Howe (2005) point out, a 'fine line' exists between developing adequate classifications to attempt merit and fairness based on functional ability, whilst not rendering competition pointless by diluting the pool of talent or competitors within a classification. In relation to this, Mills and Krassioukov (2011) acknowledge that athletes with high-level SCI and resulting ANS dysfunction present a unique challenge for a fair classification system for athletes who wish to participate in the Paralympic games and, that the complexity and variations in autonomic disorders make this process very challenging. They point out, however, that the current system of classification that focuses on the assessment of the motor function of disabled athletes, 'may be placing SCI athletes with significant ANS abnormalities at a disadvantage to competitors with similar motor function but preserved autonomic control' (p. 774).

Given that our participants have a SCI at or above the sixth thoracic spinal level, their involvement in many wheelchair sports is restricted due to the severity of their impairment. As such, they are left particularly vulnerable to exclusion by functional classification systems that are intended to be inclusive of what are deemed 'less severely' impaired athletes. In this they are not alone because as Howe and Jones (2006) and Purdue and Howe (2013) point out, changes in classification systems, particularly in Paralympic contexts, act to limit what types of impaired body can, and cannot, participate in and be successful in disability sport.

Gee et al. (2015) support the views provided above and argue that, the disadvantage athletes with a high level SCI face in achieving the appropriate cardiovascular response to exercise 'may provide added motivation to boost in an attempt to "level the playing field"' (p. 2182). Importantly, the comments by our participants on this issue, along with those in the survey conducted by Alteman et al. (2014) who felt that wheelchair rugby should *only* be open to athletes with SCI and other neurological

conditions, indicate how the perceived structural inequalities of current classification systems may influence them to justify the use of boosting by applying various mechanisms of moral disengagement. Such justifications might act to increase the temptation or likelihood of boosting and make SCI athletes feel less anticipated regret or guilt about doing so and also to ignore the potential dangers to their health.

The impact of the perceived structural inequalities generated by the current classification systems used in disability sport and how this encourages risky health behaviours resonates with Backhouse, Griffiths and McKenna's (2017) notion of a *dopogenic environment*. For them, this involves the sum of influences produced by the surroundings, opportunities and conditions that promote anti-doping rule violations (ADRVs). Backhouse et al. emphasize that local level factors (e.g., type of sport and club) work alongside structural factors (e.g., national and international sport organisation's policies), and societal attitudes to create the dopogenic environment. In a similar fashion, as our findings indicate, the individual aspirations of our participants, the type of sport they played along with the classification system of the IPC, operated in an interactive manner to produce what might be described as a *boostogenic environment*. Recognising the production of such environments is important as it shifts attention away from a focus on individual morality, ethics and shortcomings toward a consideration of the powerful interactions between individuals, their social networks and the structures that direct how SCI athletes make decisions about boosting.

In closing, we acknowledge a number of limitations in our study. It has focused solely on men and predominantly on wheelchair rugby. Whether the views and experiences of our participants are relevant to other sports that male SCI athletes take part in such as wheelchair racing requires further attention. Further attention also needs to be given to how gender and class along with race, ethnicity, age, sexuality, and other markers of difference intersect to influence the motivations, choices, and experiences of SCI athletes who choose to boost and how this is informed by the relational processes involving self and others in specific contexts. Importantly, our study has nothing to say about AD and boosting amongst female SCI athletes in wheelchair rugby and other disability sports. It is essential that future studies address these complex issues and the multiple experiences of disabled athletes.

**References**

Altmann V., Hart, A., Limbeek, J. and Vanlandewijck, Y., 2014. Improvement of the classification system for wheelchair rugby: Athlete priorities. *Adapted Physical Activity Quarterly*, 31, 377- 389.

Backhouse, S. McKenna, J. and Patterson, L., 2009. *Prevention though education: A review of current social science literature*. Montreal, Canada: World Anti Doping Agency.

Backhouse, S., Griffiths, C. and McKenna, J., 2017. Tackling doping in sport: a call to take action on the *dopogenic* environment. *British Journal of Sports Medicine*, 10.1136/bjsports-2016-097169

Bandura, A., 1991. Social cognitive theory of moral thought and action. *In:* W.Kurtines and J. Gewirtz, eds., *Handbook of moral behaviour and development: Theory, Research and applications*. Hillside, NJ: Lawrence Erlbaum Associates, Inc, 71-129.

Bhambhani, Y., Mactavish, J., Warren, S. Thompson, W.R., Webborn, A., Bressans, E., De Mello, M.T., Tweedy, S., Malone, L., Frojd, K., Van De Vliet, P. and Vanlandewijck, Y., 2010. Boosting in athletes with high-level spinal cord injury: Knowledge, incidence and attitudes of athletes in paralympic sport. *Disability and Rehabilitation,* 32, 2172-2190.

Blauwet, C., Benjamin-Laing, H., Stomphorst, J.,Van de Vliet, P., Pit-Grosheide, P. and Willick, S., 2013. Testing for boosting at the Paralympic games: policies, results and future directions. *British Journal of Sports Medicine,* 47, 832–837

Boardley, D. and Kavussanu, M., 2011. Moral disengagement in sport. *International Review of Sport and Exercise Psychology,* 4, 93-108.

Braun, V., Clarke, V. and Weate, P., 2016. Using thematic analysis in sport and exercise research. *In:* B. Smith & A. Sparkes, eds. *Routledge handbook of qualitative research in sport and exercise*.London: Routledge, 191-295.

Chatterjee, R. & Bains, S., 2018. 'Autonomic Dysreflexia and Boosting: Non-pharmacological doping in disability sport'. *British Journal of Sports Medicine Blog*. August 6th 2018. Available at: https://blogs.bmj.com/bjsm/2018/08/06/autonomic-dysreflexia-and-boosting-non-pharmacological-doping-in-disability-sport/ Accessed: 7th May 2019.

Connell, R., 2002. *Gender*. Cambridge: Polity Press.

Donnelly, P., 2004. Sport and risk culture. *In:* K. Young, ed. *Sporting bodies, damaged selves: Sociological studies of sports-related injuries*. Oxford: Elsevier, 29-57.

Elbe, A-M and Brand, R., 2016. The effect of an ethical decision-making training on young athletes' attitudes towards doping. *Ethics & Behaviour,* 26*,* 32-44.

Evans, J., Davies, B., and Rich, E. 2009. The body made flesh: embodied learning and the corporeal device. *British Journal of Sociology of Education*, *30*, 391-406.

Gard, M. and Fitzgerald, H.,2008. Tackling Murderball: masculinity, disability and the

big screen. *Sport, Ethics and Philosophy*, 2, 26-141.

Gee, C., West, C. and Krassioukov, A., 2015. Boosting in elite athletes with spinal cord injury: A critical review of physiology and testing procedures. *Sports Medicine*, 45, 1133-1142.

Gee, C., Lacroix, M. and West, C., 2018. Effect of unintentional boosting on exercise performance in a tetraplegic athlete. *Medicine and Science in Sports & Exercise*, 50, 2398-2400.

Hanson, J., 2009. Equipping athletes to make informed decisions about performance-enhancing drug use: A constructivist perspective from educational psychology. *Sport in Society*, 12, 394-410.

Harris, P., 1994. Editorial: Self-induced autonomic dysreflexia ('boosting') practised by some tetraplegic athletes to enhance their athletic performance. *Paraplegia* 32, 289-291.

Howe, P.D. and Jones, C., 2006. Classification of disabled athletes: (dis)empowering the Paralympic practice community. *Sociology of Sport Journal*, 23, 29-46.

International Wheelchair Rugby Federation. 2011. *International wheelchair rugby classification manual* (3rd ed. rev.). Retrieved from http://www.iwrf.com/?page=classification

International Paralympic Committee *Handbook 2016. IPC Position Statement on Autonomic Dysreflexia and Boosting* (Section 2, Chapter 4.3,2).

Jones, C. and Howe, P.D., 2005. The conceptual boundaries of sport for the disabled: classification and athletic performance. *Journal of the Philosophy of Sport*, 32,133-146.

Laurendeau, J., 2008. "Gendered risk regimes": A theoretical consideration of edgework and gender. *Sociology of Sport Journal,* 25, 293-309.

Lindemann, K. and Cherney, L., 2008. Communicating In and Through "Murderball": Masculinity and Disability in Wheelchair Rugby. *Western Journal of Communication*, 72, 107-125.

Legg, D and Mason, D., 1998. Autonomic dysreflexia in wheelchair sport: A new game in the legal arena? *Marquette Sports Law Review,* 8, 225-237.

Long, K., Meredith, S. and Bell, G., 1997. Autonomic dysreflexia and boosting in wheelchair athletes. *Adapted Physical Activity Quarterly*, 14*,* 203-209.

Lyng, S., 1990. Edgework: A social psychological analysis of voluntary risk-taking. *American Journal of Sociology*, 95, 851–886.

Mazzeo, F., Santamaria, S. and Lavarone, A., 2015. 'Boosting' in Paralympic athletes with spinal cord injury: doping without drugs. *Functional Neurology,* 30, 91-98.

Messner, M. 1992. *Power at play: Sport and the problem of masculinity*. Boston: Beacon Press.

Mills, P. and Krassioukov, A., 2011. Autonomic function as a missing piece of the classification of Paralympic athletes with spinal cord injury. *Spinal Cord,* 49, 768-776.

Monaghan, L., 2001. *Bodybuilding, drugs and risk.* London: Routledge.

*Murderball*. 2005. Directed by Henry Alex Rubin & Sama Adam Shapiro. Paramount Pictures.

Purdue, D. and Howe, P.D., 2012. See the sport, not the disability: exploring the Paralympic paradox. *Qualitative Research in Sport, Exercise and Health*, 4, 189-205.

Rhodes J., Mason, B., Perrat, B., Smith, M., Malone, L. and Goosey-Tolfrey, V., 2015a. Activity profiles of elite wheelchair rugby players during competition. *International Journal of Sports Physiology and Performance*. 10, 318-324.

Rhodes, J., Mason, B., Malone, L. and Goosey-Tolfrey, V. 2015b. Effect of team rank and player classification on activity profiles of elite wheelchair rugby players. *Journal of Sports Science*, 30, 2070-2078.

Riessman, C., 2008. *Narrative methods for the human sciences*. London: Sage

Ryba, T., Haapanen, S., Mosek, S. and Ng, K. 2012. Toward a conceptual understanding of acute cultural adaption: A preliminary examination of aca in female swimming. *Qualitative Research in Sport, Exercise and Health*, 4, 80-97.

Schmid, A., Schmidt-Trucksäû, A., Huonker, M., König, D., Eisenbarth, I., Sauerwein, H., Brunner, C., Storch, M.J., Lehmann, M. and Keul, J., 2001. Catecholamine response of high performance wheelchair athletes at rest and during exercise with autonomic dysreflexia. *International Journal of Sports Medicine,* 22, 2–7.

Smith, B. and Sparkes, A., 2016. Interviews: Qualitative interviewing in the sport and exercise sciences. *In*: B. Smith and A. Sparkes, eds. *Routledge handbook of qualitative research in sport and exercise*. London: Routledge, 103-123.

Sparkes , A. and Smith, B. 2014. *Qualitative research methods in sport, exercise and health: From process to product*. London: Routledge.

Sparkes, A. and Stewart, C. 2019. On-line first. How stories as actors cause trouble in lives: A dialogical narrative analysis of a competitive cyclist and the fall from grace of Lance Armstrong. *Qualitative Research in Sport, Exercise & Health,* pp.1-18. DOI: 10.1080/2159676X.2019.1578253

Tracy, S., 2010. Qualitative quality: Eight 'Big-Tent criteria for excellent qualitative research. *Qualitative Inquiry*, 16, 837-851.

Warburton, D., 2010. Commentary: Lessons learned from an outlier. *Health & Fitness Journal of Canada*, 3, 43-46.

Webborn A., 1999. "Boosting" performance in disability sport. *British Journal of Sports Medicine*, 33, 74-75.

Webborn, N. and Van de Vliet, P., 2012. Paralympic medicine. *The Lancet,* 380*,* 65-71.

Wellard, I., 2009. *Sport, masculinities and the body*. London: Routledge.

White, P., and Young, K. (Eds,)., 1999. *Sport and gender in Canada*. Toronto: Oxford University Press.

World Anti-Doping Agency 2015. *World anti-doping code 2015* (with 2018 amendments). [ONLINE]. Available at: https://www.wada-ama.org/sites/default/files/resources/files/wada_anti-doping_code_2018_english_final.pdf [Accessed 10th May 2019]

World Anti-Doping Agency 2019. *The world anti-doping code international standard prohibited list: January 2019*. [ONLINE]. Available at: https://www.wada-

ama.org/sites/default/files/wada_2019_english_prohibited_list.pdf [Accessed 10th May 2019]

Zdanivsky, B., 2010. The patient's perspective: Observations from an outlier. *Health & Fitness Journal of Canada*, 3, 39-42.